

- July 3
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11. The apparatus of claim 10, wherein the 75th percentile cycle length of the preceding series of depolarizations is calculated by selecting the fourth longest interval out of the preceding twelve measured depolarization intervals.

REMARKS

Claims 1-5 were rejected as being anticipated by Rossing (U.S. Patent No. 5,464,430) (see Office Action paragraph 3). Rossing discloses a technique for differentiating between fibrillation and tachycardia, which is discussed in the application. Rossing discloses a technique wherein a programmable fibrillation detection interval range and a programmable tachycardia detection interval range are adjacent to one another. In particular, the interval range designated as indicative of fibrillation consists of intervals less than a programmable interval (FDI) and the interval range designated as indicative of ventricular tachycardia consists of intervals less than a programmable interval (TDI) and greater than or equal to FDI. Measured R-R intervals, out of a preceding series of a predetermined number (FEB) of intervals, falling within each of these two ranges are separately counted. That is, a count (VTEC) of R-R intervals falling within the tachycardia interval range, and a count (VFEC) of the number of intervals falling within the fibrillation interval range are made. VTEC is incremented in response to R-R intervals that are greater than or equal to FDI but shorter than TDI, and is reset to zero in response to intervals greater than or equal to TDI and is insensitive to intervals less than FDI. VTEC is compared to a programmed value (VTNID) and VFEC is compared to a corresponding programmable value (VFNID). When one of the counts equals its corresponding programmable value, the criterion for the presence of the corresponding arrhythmia, i.e. fibrillation or tachycardia, is met. An

appropriate therapy, e.g. anti-tachycardia pacing, a cardioversion pulse or a defibrillation pulse, is then delivered.

This detection scheme of Rossing has proven effective in distinguishing between fibrillation and ventricular tachycardia so that appropriate therapies may be delivered. However, an increased level of accuracy in classifying rhythms having intervals close to FDI is provided by the present invention. This is provided, as set forth in amended claim 1, by (1) sorting a predetermined number of the measured depolarization intervals into a plurality of interval range bins; (2) determining the number of measured depolarization intervals within each of the interval range bins; and (3) defining a discrimination criterion based on determining whether designated ones of the plurality of interval range bins have at least a predetermined threshold number of measured depolarization intervals within them. Whereas Rossing discriminates on the basis of determining which of two interval ranges has the most counts, the present invention examines the relative distribution of the measured depolarization intervals.

Rossing does not anticipate claim 1, nor does it render claim 1 obvious.

Claims 1 and 2 were also rejected as being anticipated by Olson (U.S. Patent No. 5,855,593) (see Office Action paragraph 4). The scheme in Olson is to develop a "pattern code" for each interval based on the timing of atrial and ventricular events occurring during two preceding R-R intervals. Each of the two R-R intervals is divided into four zones. To establish a pattern code, a beat code is assigned based on the occurrence of atrial events during the R-R interval and their location with regard to the four defined zones. (Col. 8, line 38 to col. 10, line 43) Olson does not disclose a scheme involving sorting a predetermined number of the measured depolarization

intervals into a plurality of interval range bins; determining the number of measured depolarization intervals within each of the interval range bins; and defining a discrimination criterion based on determining whether designated ones of the plurality of interval range bins have at least a predetermined threshold number of measured depolarization intervals within them. Olson does not anticipate claim 1, nor does it render claim 1 obvious.

Claims 3 and 4 were rejected as being obvious over Olson in view of Adams. Olson was applied in the same fashion as in the anticipation rejection of paragraph 4. As discussed above, claim 1 is distinguishable from Olson. Therefore, the obviousness rejection as to the dependent claims also fails.

Claims 1-5 were further rejected as being indefinite. The bases for the rejections have been obviated by the amended claims.

In consideration of the amendments to the claims and the remarks presented herein, Applicant submits that all pending claims are now in condition for allowance and requests that a notice of allowance issue in due course.

Respectfully submitted,

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By: 
Girma Wolde-Michael
Reg. No. 36,724
Telephone: (763) 514-6402



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MARKED-UP VERSION OF AMENDED CLAIMSIN THE CLAIMS:

1. (Amended) Apparatus for treating tachyarrhythmias, comprising:
[treatment] means for delivering a first therapy to a patient's heart to treat tachycardia and a second therapy to said patient's heart to treat fibrillation;
[first] means for sensing an electrical [signals] signal from said patient's heart indicative of [the] a depolarization of a chamber or chambers of said patient's heart;
means for measuring [and storing the intervals] at time interval between depolarizations [separating said electrical signals];
means for storing the measured depolarization intervals;
means for detecting [the] an occurrence of a tachyarrhythmia based upon the measured depolarization intervals; and
[tachycardia/fibrillation discriminator] means responsive to [said detecting means] the detection of an occurrence of a tachyarrhythmia for discriminating between tachycardia and fibrillation and for selecting between said first and second therapies;
said discrimination and therapy selection means including
 - (i) means for sorting a predetermined number of the measured depolarization intervals into a plurality of interval range bins;
 - (ii) means for determining the number of measured depolarization intervals within each of the interval range bins; and
 - (iii) means for defining a discrimination criterion based on determining whether designated ones of the plurality of interval range bins have at least a predetermined threshold number of measured depolarization intervals within them.
3. (Amended) The apparatus of claim 1 wherein the means for defining a discrimination criterion sets a threshold number [deriving means comprises means for

deriving said threshold criterion] as a value which increases as an inverse function of the length of the intervals [separating preceding] between depolarizations.

4.(Amended) [A device according to] The apparatus of claim 1 wherein the means for defining a discrimination criterion sets a threshold number [deriving means comprises means for deriving said threshold criterion] as a value which increases as an inverse function of [the length] a defined percentile of the length of intervals [interval] over a sequence of a predetermined number of intervals [separating preceding] between depolarizations.

5. (Amended) [A device according to] The apparatus of claim 1 wherein the means for defining a discrimination criterion sets a threshold number [deriving means comprises means for deriving said threshold criterion] as a value which increases as an inverse function [of the length] of the 75th percentile of the length of intervals [interval] over a sequence of a predetermined number of intervals [separating preceding] between depolarizations.